

On the Formation of British Pearls and their possible Improvement. By ROBERT GARNER, F.L.S.

[Read December 7, 1871.]

THE formation of these beautiful ornaments has been more written about than really investigated,—written about, indeed, from Pliny downwards, and with a misapprehension of their real origin which is extraordinary, when it might have been easily explained by a little closer observation. Confining ourselves to British pearls, some of which (from the *Alasmodon* of our mountain-rivers) nearly equal the oriental ones in beauty, but including the very inferior ones from the *Mytilus* or edible mussel of our shores (the origin of which has been more especially studied), it is not difficult to convince ourselves that they are due to the existence, in the shell-secreting mantle of the animal, of minute parasitical entozoa, fully developed distomes, against which the natural protection which the mollusks have is a calcifying process around the parasites; and as after this they still act as foreign bodies, a continuation of the same process leads to the formation of pearls. It is fair to conclude that oriental pearls are formed in an analogous way; and in many other mollusks similar distomes, which are sometimes calcified, are seen. These distomes are so small as to be only just visible to the naked eye; and they always abound in the mussel which contains pearls. They may be found covered with a shelly layer so thinly as to appear quite unchanged in appearance, and to be known as incipient pearls only by pressure revealing the shelly envelope; they may sometimes be found still living, but partly covered with calcareous deposit; and, lastly, by the use of dilute acid, the young pearls may be seen to have each one or more distomes, or their remains, as a nucleus. The above was made out some years since independently; but from a *brochure* since obtained, written by Signor Antonio Villa, it would appear that others in Italy have suspected the same thing. Such is the common origin of the pearls which are found free in the mantle of the mollusks; but pearly excrescences attached to the inner surface of the shell may very likely arise from other irritants. Thus in the common *Anodon* the presence of a minute *Acarus* (*Atax*), at least the half-developed animal, appears to produce little pearly elevations on the retral side of the inner surface. In *Alasmodon* there is often a cluster of small pearls in the mantle just behind the anterior adductor muscle; but we can-

not positively affirm that in that bivalve, or, indeed, in *Unio* or *Anodon*, the pearls arise from the same exciting cause, although in the last two genera we have found them together. We are not certain what is the early life-history of the distomes; but in *Unio* the foot is sometimes found distended with capsules or mother cells, each one containing several distomes.

The above account of the matter the writer gave at one of the Meetings of the British Association, at least the principal facts; and he is not aware that it has ever been contravened. He would now proceed a little further in the subject, with a utilitarian aim.

Attempts have been made to force the mollusks to produce these pearls at the will of the experimenters. And, first, might not the *Alasmodon* of our rivers be cultivated like the salmon, so as to become more plentiful and possibly more entitled to its name *margaritiferus*?—many gravelly and rapid streams (the Dove, for instance, in its upper course) being apparently well suited for it, and having neither this species nor any of its representatives. Secondly, it has been supposed that a morbid state of the animal is more favourable to the production of pearls, or, in our view, more favourable to the generation of the distomes; and could not that be brought about by a transfer, or some such contamination of the water as the Chinese are said to practice? Thirdly, could not the *Alasmodon* be forced to form pearls by carefully introducing foreign bodies between the mantle and the shell, not as Linnæus is said to have done, by breaking or boring the shells, but by prizing them a little open and so introducing such bodies? The people just alluded to, we should suppose, so introduced the metallic or shelly nuclei, thus producing the well-known pearly excrescences resembling Buddha, as well as large pearls. We have had no opportunity of operating on the *Unio* or *Alasmodon*, though they may be kept alive for a long time under a tap; but we have made a few trials on the common *Anodon*, and present the specimens. Our plan was to prize open the valves a little, separate the mantle from the valves, and then introduce several pearls from the common *Mytilus*, in the hope that they would become coated with a layer of brighter nacre. In two months the pearls had become adherent to the shells—and in three, more or less increased by coats of nacre. As I before said, with the true British pearl-mussel I have not been able to make the trial. Réaumur and Linnæus seem to have failed with experiments of this kind; but other trials might be more successful,

and we ourselves should be rather sanguine that by introducing the common pearls within the valves of the true pearl-mussel we should obtain good pearls. Lastly, is it possible to *improve* the mean-looking pearls produced in such quantities in some localities in the edible mussel? We have made a few experiments in this last direction; and though we have not made our fortune or taken out a patent, we have found that they really may be much improved by chemical means, some made quite ornamental. The method we have tried is boiling the pearls for a short time in a dilute solution of potash and afterwards letting them remain in it for a few days, noting that a very strong solution destroys their lustre instead of increasing it. These inferior pearls have been collected for sale for many years in the lower Conway; and we think it possible that they are afterwards submitted to some such process. The pearls which are obtained from the *Alasmodon*, between Llanrwst and Bettws-y-coed, are very different and need no such treatment; in fact some of those found have fetched a high price, and they appear to wear better than oriental pearls.

Late in August of this year I examined a dozen *Alasmodons*; none of them had the ova transposed to the branchiæ, though they were ejecting them from the oviducts. The pericardium could be made out to communicate with the suprarenal sacs, as Professor Rolleston, I think, was the first to ascertain. In the depth of the foot of the *Anodon*, at some distance before and below the pedal ganglion, is a little yellowish-brown body about the size of a mustard-seed, of a waxy consistence and formed of several *emboîtures*. We should consider this to be a rudiment of a byssus-gland rather than of the organ of hearing. There is also a curved band of yellowish thickened mantle below the hinge, which requires explanation.

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Note on a Chinese Artichoke Gall (mentioned and figured in Dr. HANCE's paper "On Silkworm-Oaks") allied to the European Artichoke Gall of *Aphilothrix gemmæ*, Linn. By ALBERT MÜLLER, F.L.S.

[Read February 15, 1872.]

FROM the valuable "Supplementary Note on Chinese Silkworm-Oaks," by Dr. H. F. Hance (Journ. Linn. Soc. Botany, vol. xiii. No. 65) I select for consideration the following passages, which are of special interest as affording the first intimation of the occurrence of a cynipideous oak-gall new to science:—